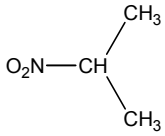
2-NITROPROPANE
CAS No. 79-46-9
First Listed in the *Fourth Annual Report on Carcinogens*



CARCINOGENICITY

2-Nitropropane is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (IARC V.29, 1982; IARC S.4, 1982; IARC S.7, 1987). When administered through inhalation, 2-nitropropane induced hepatocellular carcinomas in male rats and hepatocellular nodules in rats of both sexes (NCI DCE, 1985j; IARC V.29, 1982). An inhalation study in rabbits was considered to be inadequate for evaluation by an IARC Working Group (IARC V.29, 1982).

There are no adequate data available to evaluate the carcinogenicity of 2-nitropropane in humans (IARC S.7, 1987). However, the ACGIH considers 2-nitropropane a suspected human carcinogen (ACGIHa, 1986).

PROPERTIES

2-Nitropropane is a clear, colorless liquid with a mild, fruity odor. It is soluble in water, alcohol, and ether. 2-Nitropropane is flammable when exposed to heat, open flame, or oxidizers, and when heated in the liquid or vapor form, it may explode. It is available in the United States in at least two commercial grades, one of which is a mixture with 1-nitropropane.

USE

2-Nitropropane is used principally as a solvent and chemical intermediate. As a solvent, it is used in inks, paints, adhesives, varnishes, polymers, and synthetic materials. It is a feedstock for the manufacture of 2-nitro-2-methyl-1-propanol and 2-amino-2-methyl-1-propanol (IARC V.29, 1982).

PRODUCTION

The Chem Sources USA directory identified 3 U.S. companies producing an unreported quantity of 2-nitropropane in 1986 and 21 suppliers (Chem Sources, 1986). USITC identified one major U.S. producer from 1977 to 1987 and two producers in 1988 with no production data reported (USITC, 1987). Data provided by the major domestic producer of 2-nitropropane suggest that worldwide sales of 2-nitropropane in 1986 had declined to about 5 million to 6 million lb with an unreported amount used internally by the company as a chemical intermediate. The 1979 TSCA Inventory identified one producer of 2-nitropropane in 1977, with a production volume of 500 lb and one importer with no information on the amount imported (TSCA, 1979). However, NIOSH reported one U.S. producer had an estimated production volume in 1977 of 30 million lb. Of this amount, 18 million lb were used internally by the manufacturer or exported (NIOSH 17, 1977).

EXPOSURE

The primary routes of potential human exposure to 2-nitropropane are inhalation, ingestion, and dermal contact. Potential occupational exposure to 2-nitropropane occurs during its manufacture and formulation in industrial construction and maintenance, printing, highway maintenance, and food packaging. The number of U.S. workers potentially exposed to 2-nitropropane had been estimated variously to be 29,842 in 1970 (NIOSH, 1976), 100,000 in 1977 (NIOSH 17, 1977), and 185,000 in 1980 (NIOSH, 1980). The National Occupational Exposure Survey (1981-1983) indicated that 8,202 workers, including 1,727 women, potentially were exposed to 2-nitropropane (NIOSH, 1984). Limited occupational monitoring data are available for 2-nitropropane. Sampling at a production plant in 1977 indicated that 141 of 144 samples were in the time-weighted average (TWA) concentration range of 0.2-10 ppm. Monitoring in 1962 indicated that concentrations in the air during drum-filling operations ranged between 580 and 1640 ppm (NCI DCE, 1985j). Concentrations in the air at a tire manufacturing plant and chemical plant were 0.05 ppm and 1 ppm, respectively (IARC V.29, 1982). The maximum airborne concentration of 2-nitropropane is 22,000 ppm. The accepted odor threshold has recently been reduced from ≥ 80 ppm to 3-5 ppm (NCI DCE, 1985j). ACGIH has noted the potential contribution to overall exposure by the cutaneous route, including mucous membranes and eyes, either by airborne contact, or more particularly, by consumption of the substance (ACGIH, 1986). In 1983, FDA estimated that based on its presence in food, food additives, or food packaging, potential daily intake of 2-nitropropane per person in the United States was 0.1 µg. Use of the compound in food packaging includes printing inks for flexible food packages, a solvent for coating beer and beverage cans, and a solvent for film laminating adhesives. The worst case exposure from these uses was estimated to be 36 ng/person/day. FDA measured concentrations between 77 and 204 ppb in vegetable oil fractionated with 2-nitropropane. Use for these oils include products such as frying fats, oil dressings, and imitation cocoa butter in chocolates. The intake from these products was calculated to be 30 ng/person/day (FDA, 1983). The ACGIH (1986) recommended threshold limit value (TLV)-TWA is 10 ppm 635 mg/m^3) with no short-term exposure limit. The Toxic Chemical Release Inventory (EPA) listed 13 industrial facilities that produced, processed, or otherwise used 2-nitropropane in 1988 (TRI, 1990). In compliance with the Community Right-to-Know Program, the facilities reported releases of 2-nitropropane to the environment which were estimated to total 650,000 lb.

REGULATIONS

In 1980 CPSC preliminarily determined that 2-nitropropane was not present in consumer products under its jurisdiction. Subsequently, public comment was solicited to verify the accuracy of this information; no comments were received. Pending receipt of new information, CPSC plans no action on this chemical. EPA regulates 2-nitropropane under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Food, Drug, and Cosmetic Act (FD&CA), Resource Conservation and Recovery Act (RCRA), and Superfund Amendments and Reauthorization Act (SARA). 2-Nitropropane is subject to reporting requirements under CERCLA, RCRA, and SARA. Under CERCLA, EPA has established a reportable quantity (RQ) of 10 lb. Under FD&CA, 2-nitropropane is subject to regulations and data labeling requirements for its use as an ingredient of pesticides. EPA has proposed reporting/recordkeeping requirements for 2-nitropropane under the Toxic Substances Control Act (TSCA). FDA regulates 2-nitropropane under FD&CA as a food additive and has proposed prohibiting its use in human food or in packaging in contact with food. NIOSH recommends that exposure be limited to the lowest feasible concentration. OSHA has revised the permissible exposure limit (PEL) to ± 10 ppm as an 8-hr TWA. OSHA also regulates 2-nitropropane under

the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-98.